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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

SONG, HOON K

ART UNIT PAPER NUMBER

2882

DATE MAILED: 11/19/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/936,560

Applicant(s)

WALLIS ET AL.

Examiner

Hoon Song

Art Unit

2882

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-- The MAILING DATE of this communication appears on the cover sheet with the corresponding address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 35-70 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 35,39-61 and 63-70 is/are rejected.
- 7) ☒ Claim(s) 36-38 and 62 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 October 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Specification

This application does not contain an abstract of the disclosure as required by 37 CFR 1.72(b). An abstract on a separate sheet is required.

The disclosure is objected to because of the following informalities: Section headings are missing.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 63-68 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite in that it fails to point out what is included or excluded by the claim language. This claim is an omnibus type claim.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 35, 39-58 and 69-70 are rejected under 35 U.S.C. 102(b) as being anticipated by Takemi et al. (US 5530732).

Regarding claim 35, Takemi teaches a method of determining the relative amounts of different chemical elements in the chemical composition of a crystalline semiconductor material, the method (column 1 line 11+) comprising

diffracting a beam of radiation off said crystalline material and measuring the angle of at least one diffraction peak and the intensity of a portion of the diffracted radiation integrated over a portion of said at least one diffraction peak located at said diffraction angle (column 2 line 37+) and

using a processor to determine the relative amounts of the elements in the chemical composition of said crystalline material by using values derived from the radiation scattering powers of said elements and the position and integrated intensity of said portion of said at least one diffraction peak (column 2 line 45+).

Regarding claim 39, Takemi teaches that the or each or some of said diffraction peaks or the or each or some of said portions of said diffracted energy is resultant from a reflection (column 1 line 64+).

Regarding claim 40, Takemi teaches that using a knowledge of the structure of said material and the possible elements present in said material to determine the chemical composition of said material (column 2 line 61+).

Regarding claim 41, Takemi teaches that said crystalline semiconductor material is assumed to be comprised of only a finite number of known predetermined chemical elements and said processor has operational in its processing of the measured input data and stored element scattering power values only the scattering powers for the

known predetermined assumed finite number of elements that are assumed to be present (figure 1)

Regarding claim 42, Takemi teaches that said material is assumed to be comprised of four or less chemical elements (figure 1).

Regarding claim 43, Takemi teaches that determining the composition of a layer of a material and making use either of (i) a knowledge of the thickness of said layer (column 3 line 51+)

Regarding claim 44, Takemi teaches that determining the composition of a single layer of a material on a substrate of said material.

Regarding claim 45, Takemi teaches that measuring the position of at least two diffraction peaks (column 2 line 37+).

Regarding claim 46, Takemi teaches that measuring the intensity of diffracted beams at least two positions (column 2 line 37+).

Regarding claim 47, Takemi teaches that measuring the intensity of either of two diffraction peaks (column 2 line 37+).

Regarding claim 48, Takemi teaches that said semiconductor material is a quaternary semiconductor material (column 1 line 32+).

Regarding claim 49, Takemi teaches that said semiconductor material is a ternary semiconductor material (column 1 line 35+).

Regarding claim 50, Takemi teaches that measuring a parameter indicative of the lattice parameter of said quaternary semiconductor material (column 1 line 32+)

Regarding claim 51, Takemi teaches that said semiconductor material is a III-V semiconductor material (column 1 line 32+).

Regarding claim 52, Takemi teaches that said composition of an at least partially strained semiconductor material is analyzed (column 1 line 32+).

Regarding claim 53, Takemi teaches that said semiconductor material is a single crystal material (column 1 line 32+).

Regarding claim 55, Takemi teaches that measuring a parameter indicative of the lattice parameter of said semiconductor material (column 1 line 59+).

Regarding claim 56, Takemi teaches that the method is used to analyze the composition of a buried, non-surface, layer in the semiconductor material (figure 1).

Regarding claim 57, Takemi teaches that the detected composition of said semiconductor material to a reference composition to determine if the detected composition is either (i) equal to that composition (column 2 line 38+)

Regarding claim 58, Takemi teaches that integrating said portion of the diffracted radiation over a region of said diffraction peak centered upon a point of maximum intensity of said diffraction peak (column 2 line 18+).

Regarding claim 69, Takemi teaches a method of determining the relative amounts of different chemical elements in the chemical composition of a crystalline quaternary semiconductor material (column 1 line 37+), the method comprising

diffracting a beam of radiation off the crystalline material and measuring the angle of at least one diffraction peak and the intensity of diffracted radiation at said diffraction angle (column 2 line 23+),

and using a processor to determine the relative amounts of the elements in the chemical composition of said crystalline material by using values derived from the radiation scattering powers of the elements and the position and intensity of said at least one diffraction peak (column 2 line 38+).

Regarding claim 70, Takemi teaches a method of determining the relative amounts of different chemical elements in the chemical composition of a crystalline semiconductor material (column 1 line 11+), the method comprising

diffracting a beam of radiation off the crystalline material and measuring the angle of at least one diffraction peak and the intensity of a portion of the diffracted radiation integrated over a window centered on the maximum peak intensity of said at least one diffraction peak located at said diffraction angle (column 2 line 23+), and using a processor to determine the relative amounts of the elements in the chemical composition of said crystalline material by using values derived from the radiation scattering powers of said elements and the position and integrated intensity of said window of said at least one diffraction peak (column 2 line 38+).

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 59 is rejected under 35 U.S.C. 102(b) as being anticipated by Ruud et al. (US 5414747).

Regarding claim 59, Takemi teaches a method of analyzing the composition of an at least partially stained material (column 4 line 11+) comprising irradiating said material with energy from an energy source (figure 1) which energy is diffracted from the material (figure 2), detecting one or more portions of said diffracted energy, and analyzing said or each detected portion to obtain a parameter indicative of the position and/or intensity of the or each portion (figure 3 and 4).

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 60-61 are rejected under 35 U.S.C. 102(e) as being anticipated by Hall (US 6072853).

Regarding claim 60, Hall teaches a chemical composition analysis apparatus comprising a sample holder, a beam source, at least one detector, a controller, and a processor, said controller being adapted to control said beam source and detector in use so as to direct a beam of energy onto a sample held in said sample holder and detect diffracted energy at diffraction angles (figure 7), said detector(s) being coupled to said processor to provide said processor in use with signals representative of the position of a diffraction peak and the intensity of said diffraction peak, and said

processor being arranged such that in use it uses the detected signals, in combination with an assumption of what predetermined elements are present in said sample and the scattering power of atoms of the elements that are assumed to be present (column 6 line 41+), or a factor dependent upon the scattering power of the predetermined elements, to evaluate the relative amounts of the predetermined chemical elements in the chemical composition of said sample (column 3 line 64+).

Regarding claim 61, Hall teaches an element selection inputter adapted to enable a user to identify to said processor (22, computer) which chemical elements are to be assumed to be present in said sample to be analyzed, and therefore which chemical element scattering powers, or factor dependent upon the scattering powers, are to be used by said processor in determining the relative amounts of the chemical elements in the sample, said processor being adapted in use to operate with its processor on the measured input variables from said detector(s) and a subset of element scattering powers, or derived values, selected from a larger set of stored element scattering powers, or derived values, said subset being selectable by the operation of the element selection inputter (column 6 line 41+).

Allowable Subject Matter

Claims 36-38 and 62 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding claim 36, None of the prior art teaches or suggest that the or each or some of said diffraction peaks, or the or each or some of said portions of said diffracted energy, is at a quasi-forbidden angle of diffraction from said semiconductor material.

Regarding claim 37, None of the prior art teaches or suggest that the or each or some of said quasi-forbidden diffraction is at a (002) reflection.

Regarding claim 38, None of the prior art teaches or suggest that the or each or some of said quasi-forbidden diffraction is at a (006) reflection.

Regarding claim 38, None of the prior art teaches or suggest that said sample holder, beam source and detector(s) are pre-set at predetermined positions relative to each other at a relationship where for a sample of a known kind said or at least one detector is disposed so as to detect at a quasi-forbidden diffraction angle.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hoon Song whose telephone number is 703-308-2736. The examiner can normally be reached on 8:30 AM - 5 PM, Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Glick can be reached on 703-308-4858. The fax phone number for the organization where this application or proceeding is assigned is 703-308-7722.


Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

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Hoon Song

HKS



EDWARD J. GLICK
SUPERVISORY PATENT EXAMINER